Technical Discussion Paper

Bundaberg flood protection study
Developing a 10-year action plan for flood mitigation in Bundaberg.

Option J – Floodway house purchase scheme

Option J would involve either purchase or relocation (via land-swap) of select residential blocks in Bundaberg North that are deemed to be in a floodway with high depths and velocities.

Stage 2 of the Bundaberg flood protection study involves assessing 11 flood mitigation options, including those identified through consultation with the Bundaberg community in late 2015.

Option overview

Option J involves either purchase or relocation (via land-swap) for all houses in the high flood hazard parts of Bundaberg North. A land-swap scheme would involve a change in land titles and a new parcel of land (located out of the floodplain) provided for property owners in return.

The houses to be purchased or relocated would be determined based on those parts of the residential precinct with a very high flood hazard. The flood modelling assessments indicate there are numerous residential blocks west of Hinkler Avenue (and a smaller area east of Hinkler Avenue) where the 1% AEP flood results in high depth and high velocity floodwater. One possible threshold for selection for purchase or land-swap is that the velocity-depth product for the whole residential block (i.e. an area bounded by four streets) is greater than 2.0 m$^2$/s. This indicates a highly hazardous area as the standard for adult wading safety is 0.6 m$^2$/s. These results are consistent with the high flood flows experienced in January 2013.

About 130 buildings have been identified within these high flood hazard residential blocks. Purchase of only some of these houses (possibly through a voluntary purchase scheme) would result in potentially increased flood hazard for those left behind. However, planting of vegetation on these vacant blocks could allow removal of houses over a longer period of time (say 10 years).

Figure 1 shows the high flood hazard residential blocks which meet the high flood hazard criteria.

Figure 1: Option layout

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1% AEP flood is the name given to a flood event which has a 1 in 100 or 1% chance of occurring in any year. It would be similar to the January 2013 flood.
What would this option achieve?

Removing buildings from a major flow path through Bundaberg North would increase conveyance in this area, potentially lowering flood levels for other Bundaberg North residents. This option would:

- Avoid over-floor flooding for 130 properties in Bundaberg North in a 1% AEP flood event by removing these properties and their inhabitants from the floodplain, such that the moved buildings are no longer affected by Burnett River flooding.

The residential blocks have the potential to be turned into sports facilities or parkland, becoming a useful and enjoyable recreational area for Bundaberg residents.

The social impacts of removing families from communities are not insignificant on an individual scale. For those who are eligible, the scheme may have moderate social impacts due to residents moving away from their local community.

Example of Voluntary House Purchase Scheme Outcome
Viability
A key step in the options assessment involves identifying issues that may mean construction or implementation of the option is not viable. These relate to matters such as:
- The likelihood of obtaining environmental approvals, due to unacceptable environmental impacts
- Significant or unaffordable costs of construction or ongoing maintenance
- Potential for unacceptable impacts on other areas.

An option is considered to be unviable where the assessment identifies one or more of these matters are ‘unlikely to be achieved’.

The assessment of Option J found that this option is viable. Environmental approval is likely due to the works being undertaken mainly in the urban area and limited impacts expected outside the benefitted area. The option was ranked as affordable due to the non-tangible benefits associated with reducing the risk to life during floods.

Costs and benefits
Initial cost estimates indicate that this option would cost in the order of $39 million. Costs would also include ongoing vegetation management and maintenance.

The preliminary flood damages assessment for this option suggests that the estimated reduction in flood damages (i.e. the tangible benefits) would be in the order of $5 million.

Summary of assessment against key criteria
Each option has been assessed against a set of 16 criteria. These criteria, if achieved by an option, indicate a strong link between the option and the overall objectives of the Bundaberg Flood Protection Study. The performance of this option against the 16 criteria is presented on the next page. These assessments will be used to derive an overall multi-criteria analysis score for this option. This score is then used in conjunction with other assessments to compare this option against the other options.

A summary of the performance of this option against the criteria as well as the costs, benefits and viability issues is presented below.

- This option would remove 130 properties from the floodplain.
- The purchase of houses would have a result in social changes and social impacts in this area.
- In rare floods (i.e. larger than 2013 flood), the flooding conditions in this area become extremely hazardous and would likely result in destruction of many houses.
- The costs of the option are more than eight times the benefits to be realised through reduced flood damages. However, there are other non-tangible benefits associated with reducing the risk to life during floods, especially rare floods.
## Evaluation criteria

<table>
<thead>
<tr>
<th>Objective</th>
<th>Criteria</th>
<th>How does it perform against the criteria?</th>
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<tbody>
<tr>
<td><strong>Reduce flood risk to life and reduced flood impacts on people</strong></td>
<td>Improves people’s safety during flood events and people’s ability to evacuate</td>
<td>Removing houses from the floodplain increases people’s safety so partially meets criteria.</td>
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<tr>
<td>Reducing the occurrence of flood deaths and injury and improving people’s ability to plan for and recover after a flood</td>
<td>Reduces the impacts on people for very large / rare floods (larger than say Jan 2013 flood)</td>
<td>Removing houses from the floodplain reduces the impact of very large / rare floods on people so partially meets criteria.</td>
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<tr>
<td></td>
<td>Increase people’s resilience to flooding by improving their preparation for flood events and ability to recover after flood events</td>
<td>Removing people from the floodplain means they will no longer experience flooding, removing the need to prepare and recover from flood events so partially meets criteria.</td>
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<td></td>
<td>Targets vulnerable community members or areas (e.g. elderly, poor)</td>
<td>Would benefit vulnerable communities in Bundaberg.</td>
</tr>
<tr>
<td><strong>Reduce flood risk to property</strong></td>
<td>Reduces damages and costs to residential property caused by floods</td>
<td>Minor reduction in residential flood damages.</td>
</tr>
<tr>
<td>Reducing flood damages and properties and improving the recovery of businesses after floods</td>
<td>Reduces damages and costs to business / industry / government caused by floods</td>
<td>Close to no change to existing situation.</td>
</tr>
<tr>
<td></td>
<td>Reduces the impacts on property for very large / rare floods (larger than say Jan 2013 flood)</td>
<td>Removing houses from the floodplain reduces the impact of very large / rare floods on property so partially meets criteria.</td>
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<td></td>
<td>Increase a property’s “flood resilience” (improving a property so it is less affected by a flood event and recovery after an event is faster)</td>
<td>Removing a property from the floodplain increases its resilience so partially meets criteria.</td>
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<tr>
<td><strong>Achieve a balanced investment approach that considers social, economic and environmental issues</strong></td>
<td>Economic benefits (increased confidence leading to economic growth) for the broader region</td>
<td>No change to existing situation.</td>
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<td>Environmental benefits: Terrestrial, aquatic, riverine benefits, effects upon heritage</td>
<td>Possible creation of parkland no change to existing situation.</td>
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<tr>
<td><strong>Considering social, economic and environmental issues (independent of the improvements to flooding)</strong></td>
<td>Social Health benefits: Effects upon mental health, psychological issues, stress</td>
<td>Removing people from the floodplain removes the stress and psychological issues associated with flooding.</td>
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<td></td>
<td>Community benefits: Effects upon &quot;livability&quot; of the area, urban amenity, social cohesion</td>
<td>Removing properties can interrupt a landscape, affecting amenity, which may result in significant impacts to social cohesion.</td>
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<td>Removed blocks can become parkland, increasing amenity.</td>
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<td><strong>Long term reduction in flood risk and adaptable levels of protection</strong></td>
<td>Adaptable flood performance with respect to climate change</td>
<td>People would be relocated out of the floodplain to a level such that the impacts of climate change would not impact their properties.</td>
</tr>
<tr>
<td>A focus on the long-term benefits and adaptability of options and also the impact on future development land</td>
<td>Long term benefits</td>
<td>Removing people from the floodplain has a permanent benefit.</td>
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<td>Decreases flood damage to areas of future development</td>
<td>No change to existing situation.</td>
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<td>Staged benefits with staged construction / investment</td>
<td>Staging the removal of blocks of land is possible over log period of time (10 years). However, there is a need to ensure flows are not made worse for remaining houses.</td>
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✅ Achieves the criteria ✅ Partially achieves criteria or has no change to current status ✗ Does not achieve the criteria
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Find out more about this option
Community consultation on the flood mitigation options and the findings of the options assessment will take place from 24 October to 20 November 2016. To find out more about the flood mitigation options and to provide your feedback:

Visit the website
www.qld.gov.au/bundabergfloodstudy
Interactive mapping is available on the website so that you can see how the flood mitigation options would change flooding in your area.

Contact the project team
Email: bundabergfloodprotection@jacobs.com
Telephone: 1800 994 015 (during business hours)

Next steps
The Bundaberg flood protection study is due to be completed later this year. Engagement on the 10-year action plan will occur in 2017. It is important to note that the flood mitigation options have not yet been considered by the State government and are not government policy. No commitment will be made on any of the options until the State government has consulted with the community and stakeholders on the 10-year action plan.

The Queensland Government will continue to engage with the Bundaberg community as the action plan develops.